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Water distribution in stems of Amaranthus cruentus L. examined by NMR-microtomography

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Abstract

NMR-microtomography was applied to study the water distribution in stem tissues of Amaranthus cruentus L. at both the flower bud-formation and flowering stages. In amaranth stems, two buffer regions for water accumulation were shown: the inner aquiliferous pith parenchyma and an outer layer situated at the stem periphery and coinciding with the primary cortical parenchyma. In the course of gradual desiccation of the plant, water accumulated in the inner aquiliferous pith parenchyma cells was lost first, whereas the outer aquiliferous layer of cortical cells bordering the meristematic zone remained relatively unchanged. It was suggested that the central pith of the stem serves a damper function during desiccation, while the outer cortical layer maintains homeostasis. NMR-microtomography is promising for studying water relations in plants belonging to diverse ecological groups.

Keywords

Amaranthus cruentus, Dehydration, NMR-microtomography